

REMARKS

Applicants cancelled the original claims and provided new claims 37 to 70 to more carefully explain and describe the present invention.

These amendments mirror the original claims and follow the advice of the Examiner regarding new claims 37 and 38. The support is found throughout the specification and original claims. All amendments are made without prejudice or disclaimer. No new matter is added to the application.

ELECTION

Applicants still traverse this restriction and reserve the rights to file divisional and continuation application for rights consistent with the scope of the originally filed specification and claims.

Any amendments made herein are not to be considered a waiver or estoppel for obtain these broader rights in later filed applications.

The amendments are not be construed that Applicants agree with the Examiner's assertions regarding rejections or enablement.

REJECTION OF CLAIMS 38, & 40-70  
UNDER 35 U.S.C. 112 (FIRST PARAGRAPH)

"Claims 38, & 40-70 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention."

The Examiner states that:

"Applicants have shown that representative examples of the claimed compounds can inhibit caspases *in vitro*. It is stipulated the the following two claims are enabled:

*A method of inhibiting a caspase comprising administering a compound according to claim 1 to a human subject in need thereof for a time and under conditions*

*effective to inhibit a caspase.*

*A method of inhibiting apoptosis comprising administering a compound according to claim 1 to a human subject in need thereof for a time and under conditions effective to inhibit caspase.*

Pursuant to the directives of the amendment filed 6/4/04, claims 1-36 have been cancelled, and claims 37-70 added. (Applicants have asserted that claims 37-71 were added, but no claim 71 has been presented). Claims 37-70 are now pending.

Applicants' arguments filed 6/4/04 have been considered and found not persuasive.

35 U.S.C. §101 reads as follows:

“Whoever invents or discovers any new and useful process, machine, manufacture or composition of matter or any new and useful improvement thereof, may obtain a patent therefore, subject to the conditions and requirements of this title.”

Claim 38 is rejected under 35 USC §101 because the claimed invention is not supported by a well established utility.

Claim 38 is drawn to a method of inhibiting apoptosis. While this may be beneficial under some circumstances, and for certain cell types, it will be deleterious under other circumstances, and for other cell types. Consider the following:

- Kanegane Hirokazu (*Pediatric nephrology* (Berlin, Germany) **18** (5) 454-6, 2003) discloses that mutations in the *Fas* gene result in impaired apoptosis (at least *Fas*-mediated apoptosis), and that as a result of this, autoimmune disease and glomerulonephritis occurs. Thus, one would conclude that inhibiting apoptosis will result in autoimmune disease and glomerulonephritis.
- Strasser A. (*Annals of the New York Academy of Sciences* **917**, 541-8, 2000) discloses that Bim is a member of the Bcl-2 family of proteins, and that Bim induces apoptosis. Strasser further discloses that Bim-deficient mice develop autoimmune disease and glomerulonephritis. Thus, one would conclude that inhibiting apoptosis will result in autoimmune disease and glomerulonephritis.
- Van Den Brande, Jan M. H. (*Annals of the New York Academy of Sciences* **973** 166-80, 2002) discloses that Crohn's disease can be treated by inducing T-lymphocyte apoptosis. The skilled artisan would conclude that if Crohn's disease can be treated by inducing

apoptosis, then any attempt to inhibit apoptosis would only exacerbate the patient's condition.

- Kacinski B M (*Annals of the New York Academy of Sciences* **941**, 194-9,2001) discloses that the methods of treating cutaneous T-cell lymphoma that are most successful act by inducing T-cell apoptosis. The skilled artisan would therefore conclude that if cutaneous T-cell lymphoma can be treated by inducing apoptosis, then any attempt to inhibit apoptosis would only exacerbate the patient's condition.
- Tsuchiyama Y (*Kidney International* **58** (5) 1941-52, 2000) discloses that galectin-9 is effective to treat nephritis, and that dexamethasone is also effective in this regard. Both of these agents induced apoptosis of splenic CD8+ cells. The skilled artisan would conclude that if nephritis can be treated by inducing apoptosis, then any attempt to inhibit apoptosis would only exacerbate the patient's condition.
- Li X. C. (*Current Opinion in Immunology* **12** (5) 522-7,2000) discloses that T cell apoptosis is required for transplantation tolerance. The skilled immunologist would conclude that attempts to inhibit apoptosis would result in transplantation rejection.
- Bednarski Jeffrey J. (*Arthritis and rheumatism* **48** (3) 757-66, 2003) discloses that a compound designated Bz-423 induces apoptosis, and is effective to mitigate autoimmune disease such as glomerulonephritis and arthritis. The skilled immunologist would conclude that attempts to inhibit apoptosis would cause autoimmune disease, or at least exacerbate it.

In addition to the foregoing, there is the matter of inhibiting apoptosis in patients who are stricken with cancer, or persons who are pre-cancerous and predisposed to tumor growth. As applicants may recognize, inhibiting apoptosis is not going to be helpful. Thus, it is just as likely that inhibiting apoptosis will cause illness (or exacerbate it) as to mitigate it. Given that the effect of administering the claimed compounds is likely to be to cause illness, or to exacerbate an existing illness, it appears that the claimed compounds will not be useful.

Claim 38 is also rejected under 35 USC §112 first paragraph. Specifically, since the claimed invention is not supported by a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention.

The following is a quotation of the first paragraph of 35 U.S. §112:

The specification shall contain a written description of the invention, and of the manner and

process of making and using it in such full, clear, concise and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 38, 40-70 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicants have shown that representative examples of the claimed compounds can inhibit caspases *in vitro*. It is likely to be true that for certain cell types, apoptosis will be inhibited. But the specification gives no guidance as to which cell types will exhibit reduced apoptosis, and which will not. As it happens, the skilled artisan who has observed inhibition of apoptosis in one cell line (as a consequence of incubation with compound "X") cannot "predict" what other cell lines will undergo reduced apoptosis in the presence of compound "X". The skilled artisan also cannot predict what other cell types will undergo enhanced apoptosis in the presence of compound "X". For example, Fang X. (*Biochemical Journal* **352** pt 1 135-43, 2000) discloses that lysophosphatidic acid inhibits apoptosis in fibroblasts; at the same time, Steiner M. R. (*Annals of the New York Academy of Sciences* **905** 132-41, 2000) discloses that lysophosphatidic acid induces apoptosis in neuronal cells. Thus, if a determination is made that a given compound will inhibit apoptosis of a given cell type, the skilled artisan cannot predict the cell types in which apoptosis will be inhibited, and the cell types in which apoptosis will be induced. This conclusion is reinforced by the findings of Tsuchiyama Y (*Kidney International* **58** (5) 1941-52, 2000) who discloses that while dexamethasone induces apoptosis in both CD8+ cells and CD4+ cells, Galectin-9 induces apoptosis in CD8+ cells, but fails to induce the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicants have shown that representative examples of the claimed compounds can inhibit caspases *in vitro*. It is likely to be true that for certain cell types, apoptosis will be inhibited. But the specification gives no guidance as to which cell types will exhibit reduced apoptosis, and which will not. As it happens, the skilled artisan who has observed inhibition of apoptosis in one cell line (as a consequence of incubation with compound "X") cannot "predict" what other cell lines will undergo reduced apoptosis in the presence of compound "X". The skilled artisan also cannot predict what other cell types will undergo enhanced apoptosis in the presence of compound "X". For example, Fang X. (*Biochemical Journal* **352** pt 1 135-43, 2000) discloses that lysophosphatidic acid inhibits apoptosis in fibroblasts; at the same time, Steiner M. R. (*Annals of the New York Academy of Sciences* **905** 132-41, 2000) discloses that lysophosphatidic acid induces apoptosis in neuronal cells. Thus, if a determination is made that a given compound will inhibit apoptosis of a given cell type, the skilled artisan cannot predict the cell types in which apoptosis will be inhibited, and the cell types

in which apoptosis will be induced. This conclusion is reinforced by the findings of Tsuchiyama Y (*Kidney International* **58** (5) 1941-52,2000) who discloses that while dexamethasone induces apoptosis in both CD8+ cells and CD4+ cells, Galectin-9 induces apoptosis in CD8+ cells, but fails to induce follow inevitably from such inhibition, or from inhibiting the activation of the receptor for IL-1. However, this is not what one finds. Accordingly, the skilled artisan would expect that in endeavoring to treat inflammatory disorders using compounds that mitigate the production of or efficacy of IL-1, "unpredictable" results will be obtained. Consider also the following:

- Saez-Torres (*Clinical and Experimental Immunology* **121**, 151,2000) discloses that peptide T inhibits T cell activation and cytokine production, but that it was not effective *in vivo* to treat EAE (experimental autoimmune encephalomyelitis). This supports the assertion that where inflammation and neurodegenerative disorders are concerned, one cannot "predict" therapeutic efficacy on the basis of an *in vitro* assay.
- Hill P. A., (*J Cell. Biochem* **56** (1) 118-30, 1994) discloses that a peptide inhibitor of cysteine proteases is not an effective inhibitor of bone resorption. Thus, one cannot predict the propensity of a compound to inhibit bone resorption based on its propensity to inhibit a thiol protease.
- Steinberg (*The Scientist* **16**, 22, 2002) discloses that when researchers vaccinated transgenic mice that had developed AD-like pathology, plaques "melted away". In addition, favorable results were obtained in cognitive experiments with the mice. However, when attempted in humans, the Alzheimer's symptoms worsened. The point here is that where Alzheimer's disease is concerned, extrapolation from experimental result in animals to humans leads to unpredictable results. Steinberg went much further than applicants have, in that he carried out experiments in animals. If extrapolating from rats to humans leads to unpredictable results, it stands to reason that extrapolating from the test tube to diseased humans" will also lead to unpredictable results.
- Kitazawa R (*Journal of Clinical Investigation* **94** (6) 2397-406, 1994) investigated factors affecting osteoclastogenesis. Kitazawa discloses that anti-IL-6 Ab inhibited bone resorption *in vitro* but not *in vivo*. Thus, where bone disease is concerned, the skilled artisan would conclude that in attempting to extrapolate from the petri dish to the human, "unpredictable" results are obtained.
- Frost, Robert A. (*American Journal of Physiology. Regulatory, Integrative and Comparative Physiology* **283** (3) R698- 709, 2002) investigated the regulation of TNF $\alpha$  and IL-6 by lipopolysaccharide (LPS) in C2C12 myoblasts and mouse skeletal muscle. Treatment of myocytes with IL-1 or TNF- $\alpha$  also increased IL-6 mRNA content, and the increase in IL-

6 mRNA due to LPS could not be prevented by pretreatment with antagonists to either IL -1 or TNF. Thus, even if applicants could successfully block all interleukin-1 production using the claimed compounds, interleukin-6 levels could not be controlled, thereby leading to "unpredictable" results on inflammatory response.

- Meyers, K. P. (*Inflammation* 17 (2) 121-34, 1993) discloses that interleukin-1 receptor antagonist was not active as an antiinflammatory agent in the 24-h pleurisy model (carageenan-induced pleurisy).
- Rosenbaum J. T. (*Archives of Ophthalmology* 110 (4) 547-9, 1992) discloses that interleukin-1 receptor antagonist did not produce significant reduction in inflammation subsequent to an active Arthus reaction or subsequent to the intravitreal injection of 125 ng of endotoxin. Rosenbaum suggests that the failure of IL-1RA to be therapeutically effective may be due in part to the presence of other proinflammatory cytokines.
- Brennan (*Clinical and Experimental Immunology* 81, 278-85, 1990) discloses that TGF- $\beta$ -1 stimulated peripheral blood mononuclear cells, but only if the cells were pretreated with TGF- $\beta$ -1 when used prior to stimulation of cells (which stimulation produces the IL-1  $\beta$  by using agent "X" after stimulation of the cells leads to "unpredictable" results.
- Paris (*Journal of Infectious Diseases* 171,161-69,1995) discloses that IL-1RA was not effective to treat inflammation caused by gram-negative bacteria.

If it were really true that inhibiting the production of interleukin-1 were effective to treat inflammatory conditions, then the skilled artisan would have expected therapeutic success to Art Unit 10b) apoptosis in CD4+ cells. Thus, a claim drawn to a method of inhibiting apoptosis of any and all cell types lacks enablement.

Applicants are extrapolating from a showing of caspase inhibition *in vitro* to an assertion that all of the following diseases can be successfully treated: arthritis, metastasis, infectious diseases, meningitis, salpingitis, septic shock, respiratory diseases, inflammatory condition, cholangitis, colitis, encephalitis, endocervicitis, hepatitis, pancreatitis, reperfusion injury, ischemic diseases, myocardial infarction, stroke, ischemic kidney disease, immune-based diseases, hypersensitivity, auto-immune diseases, multiple sclerosis, bone diseases, neurodegenerative diseases, Alzheimer's Disease, Amyotrophic Lateral Sclerosis (ALS), Huntington's disease, Parkinson's disease, meningitis, spinal cord injuries, liver damage, traumatic brain injury, alopecia, AIDS and toxin-induced liver disease.

It is stipulated that some degree of inhibition of caspases will occur *in vivo*. However, enablement is lacking for the claimed invention. As stated in *Ex parte Forman* (230 USPQ 546,

1986) and *In re Wands* (8 USPQ2d 1400, Fed. Cir., 1988) the factors to consider in evaluating the need (or absence of need) for “undue experimentation” are the following: quantity of experimentation necessary, amount of direction or guidance presented, presence of absence of working examples, nature of the invention, state of the prior art, relative skill of those in that art, predictability of the art, and breadth of the claims.

Consider, for example, the following:

- Frost, Robert A (*American Journal of Physiology. Regulatory, Integrative and Comparative Physiology* 283 (3) R698-709, 2002) investigated the regulation of TNF $\alpha$  and IL-6 by lipopolysaccharide (LPS) in C2C12 myoblasts and mouse skeletal muscle. Treatment of myocytes with IL-1 or TNF-alpha also increased IL-6 mRNA content, and the increase in IL-6 mRNA due to LPS could not be prevented by pretreatment with antagonists to either IL -1 or TNF. Thus, even if applicants could successfully block all interleukin-1 production using the claimed compounds, interleukin-6 levels could not be controlled, thereby leading to “unpredictable” results on inflammatory response.
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- Brennan (*Clinical and Experimental Immunology* 81, 278-85, 1990) discloses that TGF- $\beta$  was effective to inhibit IL-1 $\beta$  production in LPs-stimulated peripheral blood mononuclear cells, but only if the cells were pretreated with TGF- $\beta$ . The IL-1 $\beta$  production was not inhibited if the TGF- $\beta$  was applied after the inducing stimulus. The point here is that if a scientist has evidence that a given agent “X” is effective to inhibit production of IL-1 $\beta$  when used prior to stimulation of cells (which stimulation produces the IL-1  $\beta$ ), attempting to inhibit production of IL-1  $\beta$  by using agent “X” after stimulation of the cells leads to “unpredictable” results.
- Paris (*Journal of Infectious Diseases* 171, 161-69, 1995) discloses that IL-1RA was not effective to treat inflammation caused by gram-negative bacteria.

If it were really true that inhibiting the production of interleukin-1 were effective to treat inflammatory conditions, then the skilled artisan would have expected therapeutic success to follow inevitably from such inhibition, or from inhibiting the activation of the receptor for IL-1. However,

this is not what one finds. Accordingly, the skilled artisan would expect that in endeavoring to treat inflammatory disorders using compounds that mitigate the production of or efficacy of IL-1, “unpredictable” results will be obtained. Consider also the following:

- Saez-Torres (*Clinical and Experimental Immunology* 121, 151, 2000) discloses that peptide T inhibits T cell activation and cytokine production, but that it was not effective *in vivo* to treat EAE (experimental autoimmune encephalomyelitis). This supports the assertion that where inflammation and neurodegenerative disorders are concerned, one cannot “predict” therapeutic efficacy on the basis of an *in vitro* assay.
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- Kitazawa R (*Journal of Clinical Investigation* 94 (6) 2397-406, 1994) investigated factors affecting osteoclastogenesis. Kitazawa discloses that anti-IL-6 Ab inhibited bone resorption *in vitro* but not *in vivo*. Thus, where bone disease is concerned, the skilled artisan would conclude that in attempting to extrapolate from the petri dish to the human, “unpredictable” results are obtained.
- Read S.J. (*Drugs and Aging* 14 (1) 11-39, 1999) discloses (e.g., abstract) that although many drugs are effective in animal models of cerebral ischemia, these drugs have largely failed to fulfill their promise in clinical trials. Applicants have argued that if a compound can inhibit a caspase *in vitro*, it will be effective to treat ischemia in a human. However, given that extrapolation from animals to humans leads to unpredictable results, it stands to reason that extrapolating from the test tube to diseased humans will also lead to unpredictable results.

Applicants are also asserting that they can successfully treat any and all “infectious diseases”. The nature of such diseases is not specified but would include diseases resulting from a bacterial infection, such as one of the following: Anthrax, Bovine Spongiform, Encephalopathy (BSE), Chicken Pox, Cholera, Conjunctivitis, Creutzfeldt-Jakob Disease, Polio, Nosocomial Infections, Otitis Media, Pelvic Inflammatory disease, Plague, Pneumonia, Dengue Fever, Elephantiasis,



Encephalitis, Fifth's Disease, Rabies, Rheumatic Fever, Roseola, Rubella, Sexually Transmitted diseases, Helicobacter Pylori, Smallpox, Strep Throat, septicemia, sickle cell anemia, ulcers, Tetanus, Toxic Shock Syndrome, Lassa Fever, Leprosy, Lyme Disease, Typhoid Fever, Measles, Meningitis, Trachoma, Toxoplasmosis, Tuberculosis, Whooping Cough, and Yellow Fever. In addition to the foregoing, viral infections (e.g., hepatitis, HIV, picornavirus) and fungal infections (e.g. candida albicans) would be included. Diseases resulting from parasitic infections would also be included, such as malaria, trypanosomiasis, schistosomiasis, onchocerciasis, leishmaniasis, amebiasis, ascariasis, babesiosis, balantidiasis, enterobius, fiarisis, blood flukes, giardiasis, hookworm, strongyloidiasis, tapeworm, toxoplasmosis, trichinosis, and trichuriasis. As it happens, there is "unpredictability" here too. The following references pertain to fungal infections:

- Buchta, V. (*Mycoses* 44 (11-12) 505-12, 2001) discloses that a patient died from a fungal infection despite being treated with compounds that exhibit anti-fungal activity *in vitro*.
- Adam (*Medicine* 65, 203, 1986) discloses (page 208, col 2) that *in vitro* susceptibility to antifungal agents did not correlate with therapeutic efficacy of the agents.
- Nagasawa M. (*Journal of Infection* 44 (3) 198-201, 2002) discloses that a patient died from a fungal infection despite being treated with compounds that exhibit anti-fungal activity *in vitro*.
- Manfredi R (*Mycopathologia* 148 (2) 73-8, 1999) discloses that two patients died from a cytotopococcus infection despite being treated with an agent that exhibited anti-fungal activity *in vitro*.
- Wang M. X. (*Cornea* 19 (4) 558-60, 2000) discloses that a patient was treated with an agent that exhibited anti-fungal activity *in vitro*, but that despite this, his fungal sclerokeratitis progressed to endophthalmitis.
- Bhalodia M V (*Journal of the Association for Academic Minority Physicians* 9 (4) 69-71, 1998) discloses that a compound that exhibited anti-fungal activity *in vitro* was not effective to treat a candida infection in a patient.
- Moore M. L. (*Journal of Perinatology* 21 (6) 399-401, 2001) discloses that a premature infant died from a fungal infection despite being treated with a compound that exhibits anti-fungal activity *in vitro*.
- Berman, Judith (*Nat Rev Genet* 3 (12) 918-30, 2002) discloses that many immunocompromised patients die from *Candida* infections in spite of having received various dosages of compounds which exhibit anti-fungal activity *in vitro*.
- van Duin David (*Antimicrobial Agents and Chemotherapy* 46 (11) 3394-400, 2002) has disclosed an example of a compound which exhibits antifungal activity *in vitro* but not *in vivo*.
- Marr K. A. (*Antimicrobial Agents and Chemotherapy* 45 (1) 52-9, 2001) discloses that a patient developed a fungal infection despite prophylactic treatment with a compound which exhibits antifungal activity *in vitro*.

Thus, even if applicants had demonstrated that the claimed compounds can inhibit growth of fungi *in vitro*, it would still follow therefrom that successful treatment of “infections” in animals could not be predicted. “Infections”, of course, would include those caused by bacteria. For example, the following would be encompassed:

Anthrax, cholera, conjunctivitis, nosocomial infections, otitis media, pelvic inflammatory disease, plague, pneumonia, dengue fever, elephantiasis, rabies, rheumatic fever, roseola, rubella, syphilis, gonorrhea, chlamydia, helicobacter, pylori, “mucosa-associated lymphoid tissue” resulting from helicobacter pylori, smallpox, strep throat, septicemia, sickle cell anemia, ulcers, tetanus, toxic shock syndrome, lassa fever, leprosy, lyme disease, typhoid fever, measles, meningitis, trachoma, toxoplasmosis, tuberculosis, whooping cough, yellow fever, vancomycin-resistant staphylococcus, diarrhea, brucellosis, diphtheria, coccidioidomycosis, and cold sores.

It is not apparent that any of these diseases can be successfully treated by the claimed compounds. The reality is that attempting to extrapolate from *in vitro* data to a therapy in humans (or other mammals) leads to “unpredictable” results. For example, Otvos “Insect peptides with improved protease-resistance protect mice against bacterial infection” (*Protein Science* 9 (4) 742-9, 2000) discloses one peptide that is active *in vitro* but not *in vivo* (due to the rapid decomposition in mammalian sera). In the field of ulcer treatment, one may look to the following references, which disclose “failure” in the treatment of such, in spite of *in vitro* efficacy in inhibition of *Helicobacter*:

Phillips, (*Helicobacter* 6, 151, 2001);  
Pilotto (*Digestive and Liver Disease* 32 (8) 667-72, 2000);  
Leung (*Expert Opin Pharmacother* 1 (3) 507-14, 2000).

As for the issue of antibiotic resistance, the following references discuss this:

Liu (*Advances in Experimental Medicine and Biology* 455, 387 1999)  
Monroe (*Current Opinion in Microbiology* 3(5) 496-501, 2000)

Specifically with regard to endotoxin-associated conditions, consider the following: Corriveau C. “Antiendotoxin therapies for septic shock” (*Infectious Agents and Disease*, 2 (1) 44-52, 1993) discloses that there have been numerous attempts over the years to treat human septic shock by inhibiting, neutralizing, or clearing endotoxin, and that the results of those attempts support a conclusion of “unpredictability” in the treatment of the same.

Thus, extrapolation from *in vitro* data to a therapy in humans (or other mammals) leads to “unpredictable” results.

The pharmaceutical composition claims are rejected because the term “pharmaceutical” implies an assertion of therapeutic efficacy. It is suggested that the existing method claims be

cancelled, and that the term "pharmaceutical" be deleted at every occurrence."

And the rejection continues.

Applicants respectfully traverse this rejection.

Applicants have cancelled the pending claims 1-36 without prejudice or disclaimer. New claims 37 to 70 are now presented for examination. Claims 37 and 38 are the method claims suggested by the Examiner. The remaining claims are dependent claims with these amendments.

Applicants argue that all of the Examiner's concerns have been met and the rejections overcome.

Reconsideration and withdrawal of this rejection is respectfully requested.

#### SUMMARY

Based on the above amendments and arguments. Applicant asserts these claims are of a form and scope for allowance.

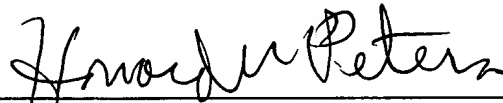
Prompt notification therefore is respectfully requested.

A petition for extension of time and fee are enclosed.

If additional fees are required for the filing of this document, the Commissioner for Patents is hereby authorized to charge or credit overpayment to Deposit Account No. 16-1331.

Respectfully submitted,

Date: 01/18/2005



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Enclosure: Petition for Extension of Time